

In the claims:

1 1. In a communication system having a sending station at which send data is sent
2 upon a channel susceptible to fading, an improvement of apparatus for the sending station for
3 converting the send data into a form to facilitate communication thereof upon the communication
4 channel, said apparatus comprising:

5 a coordinate interleaver coupled to receive modulated and rotated symbols
6 representative of the send data and to receive indications of communication conditions upon the
7 communication channel, each receive symbol at least selectably formed of a first coordinate and
8 a second coordinate, said coordinate interleaver selectably for interleaving at least selected
9 coordinates of selected ones of the modulated and rotated symbols according to a selected
10 interleaving scheme to form interleaved symbols, interleaving of the selected coordinates
11 according to the selected interleaving responsive, at least in part, to the indications of the
12 communication conditions, the interleaved symbols, once formed, for communication pursuant
13 to a transmit diversity scheme upon the communication channel.

1 2. The apparatus of claim 1 further comprising a transmit diversity creator coupled
2 to receive indications of the interleaved symbols formed by said coordinate interleaver, said
3 transmit diversity creator operable pursuant to the transmit diversity scheme to cause the
4 interleaved symbols, when sent upon the communication channel, to exhibit transmit diversity.

1 3. The apparatus of claim 2 wherein the transmit diversity scheme comprises a space
2 diversity scheme, and wherein said transmit diversity creator comprises a space diversity creator

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3 to cause interleaved symbols, when communicated upon the communication channel, to exhibit
4 space diversity.

1 4. The apparatus of claim 3 wherein said space diversity creator comprises a Radon-
2 Hurwitz encoder.

1 5. The apparatus of claim 4 wherein said space diversity creator further comprises a
2 first transmit antenna and at least a second transmit antenna spaced-apart therefrom, the first and
3 at least second transmit antennas, respectively, coupled to the Radon-Hurwitz encoder, the first
4 transmit antenna for transmitting a first data stream formed of selected interleaved symbol
5 coordinates and the second transmit antenna for transmitting a second data stream also formed of
6 selected interleaved symbol coordinates.

1 6. The apparatus of claim 1, wherein the modulated and rotated symbols to which
2 said coordinate interleaver is coupled to receive comprise trellis coded modulated and rotated
3 symbols.

1 7. The apparatus of claim 6 wherein the trellis coded modulated and rotated symbols
2 to which said coordinate interleaver is coupled to receive comprise two-dimensional trellis coded
3 modulated and rotated symbols.

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1 8. The apparatus of claim 1 wherein the communication conditions upon the
2 communication channel, indications of which are applied to said coordinate interleaver, are
3 determined at the sending station.

1 9. The apparatus of claim 8 wherein the send data sent upon the channel by the
2 sending station is sent to a receiving station, wherein the receiving station and the sending station
3 are capable of two-way communications, the receiving station further for sending receive-station
4 data to the sending station, and wherein determinations made of the communication channel
5 made at the sending station are made responsive to indications of the receive-station data sent to
6 the sending station.

1 10. The apparatus of claim 9 wherein the communication system is operable pursuant
2 to a time division duplexing scheme wherein the send data and the receiving-station data are sent
3 within a common frequency band.

1 11. The apparatus of claim 1 wherein the send data sent upon the channel by the
2 sending station is sent to the receiving station, wherein the receiving station and the sending
3 station are capable of two-way communications, the receiving station further for sending receive-
4 station data to the sending station, and wherein determinations made at the sending station of the
5 communication channel are made at the receiving station and provided to the sending station as
6 part of the receive-station data.

1 12. In the communication system of claim 1 further comprising a receiving station for
2 receiving the send data formed of the interleaved symbols, a further improvement of apparatus at

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the receiving station for operating upon the sending data, once received thereat, said apparatus comprising:

a coordinate deinterleaver coupled to receive indications of the interleaved symbols forming the send data, said coordinate deinterleaver selectably for deinterleaving the at least selected coordinates of the selected ones of the modulated and rotated symbols according to a selected deinterleaving scheme, the selected deinterleaving scheme corresponding to the selected interleaving scheme.

13. The apparatus of claim 12 wherein the send data is sent as a first data stream and at least a second data stream pursuant to a space diversity scheme by the sending station, said apparatus further comprising a coordinate combiner coupled to receive representations of the send data, said coordinate combiner for selectably combining representations of the symbols forming the send data, the representations of the symbols, once combined, forming the indications of the interleaved symbols applied to said coordinate deinterleaver.

14. The apparatus of claim 13 wherein said coordinate deinterleaver forms deinterleaved coordinates, said apparatus further comprising a decoder to which the deinterleaved coordinates are applied, said decoder for decoding the deinterleaved coordinates.

15. The apparatus of claim 1 wherein each of the first and at least second selected coordinates comprise a real component and an imaginary component and wherein the selected interleaving scheme interleaves real components of one of the selected coordinates with another of the selected coordinates.

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1 16. In a method of communicating in a communication system having a sending
2 station at which send data is sent upon a channel susceptible to fading, an improvement of a
3 method for the sending station for converting the send data into a form to facilitate
4 communication thereof upon the communication channel, said method comprising:

5 selectably interleaving coordinates of modulated and rotated symbols formed at
6 the sending station, the coordinates interleaved pursuant to a selected interleaving scheme to
7 form interleaved symbols therefrom;

8 sending the interleaved symbols upon the communication channel utilizing a
9 transmit diversity scheme.

1 17. The method of claim 16 wherein said operation of sending comprises:

2 Radon-Hurwitz encoding the interleaved symbols to form Radon-Hurwitz
3 encoded symbols; and

4 transducing the Radon-Hurwitz encoded symbols at first and at least second
5 spaced-apart antenna transducers into electromagnetic form for communication upon the
6 communication channel.

1 18. The method of claim 16 wherein the send data is communicated to a receiving
2 station and wherein said method further comprises the operation, at the receiving station, of:

3 deinterleaving coordinates of the interleaved symbols once received at the
4 receiving station pursuant to a selected deinterleaving scheme, the selected deinterleaving
5 scheme corresponding to the selected interleaving scheme.

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1 19. The method of claim 16 further comprising the operation, prior to said operation
2 of selectably interleaving, of trellis-code modulating the send data to form the modulated and
3 rotated symbols.

1 20. The method of claim 19 wherein the modulated and rotated symbols formed
2 during said operation of trellis-code modulating comprise two-dimensional, trellis-coded
3 modulated and rotated symbols.

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